

10/049153
JC18 Rec'd PCT/PTO 04 FEB 2002

Attorney Docket No. OUTO 2408
Express Mail
Label No: EL888470533
Date of Deposit: 2/1/02

CHAPTER II

TRANSMITTAL LETTER TO THE UNITED STATES ELECTED OFFICE (EO/US)

(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)

PCT/FI00/00665 3 August 2000 (03.08.00) 4 August 1999 (04.08.99)
INTERNATIONAL APPLICATION NO INTERNATIONAL FILING DATE PRIORITY DATE CLAIMED

APPARATUS FOR SUPPORTING MATERIAL TO BE TREATED IN CONTINUOUSLY
OPERATED THERMAL TREATMENT FURNACES

TITLE OF INVENTION

Taisto YRJÄNÄ (Tornio, Finland)
Heikki ARFFMAN (Kiviranta, Finland)
Heikki UURTAMO (Tornio, Finland)
Risto LEINONEN (Tornio, Finland)
Jussi YLI-NIEMI (Tornio, Finland)

APPLICANT(S)

Box PCT
ASSISTANT COMMISSIONER FOR PATENTS
Washington, D.C. 20231

Attention: EO/US

1. This national phase application claims priority of the following national application(s):

Finnish Patent Application No. 19991668 filed August 4, 1999.

2. Applicant herewith submits to the United States Elected Office (EO/US) the following items under 35 USC 371:

- A. This express request to immediately begin national examination procedures (35 USC 371(f)).
- B. The U.S. National Fee (35 USC 371(c)(1) and other fees (37 CFR 1.492) indicated in the attached fee calculation sheet.

3. A copy of the International application as filed [35 USC 371(c)(2)]:
 - a. is transmitted herewith.

b. is not required as the application was filed with the United States Receiving Office.

c. has been transmitted

i. by the International Bureau. Date of mailing of the application (from form PCT/IB/308): 15 February 2001 (15.02.01).

ii. by applicant on (date) _____.

4. A translation of the International application into the English language [35 USC 371(c)(2)]:

a. is transmitted herewith.

b. is not required as the application was filed in English.

c. was previously transmitted by applicant on (date) _____.

d. will follow (within 32 months of earliest priority date).

5. Amendments to the claims of the International application under PCT Article 19 [35 USC 371(c)(3)]:

a. are transmitted herewith.

b. have been transmitted

i. by the International Bureau. Date of mailing of the amendment (from form PCT/IB/308): _____.

ii. by applicant on (date) _____.

c. have not been transmitted as

i. applicant chose not to make amendments under PCT Article 19. Date of mailing of Search Report (from form PCT/ISA/210): 5 December 2000 (05.12.00).

ii. the time limit for the submission of amendments has not yet expired. The amendments or a statement that amendments have not been made will be transmitted before the expiration of the time limit under PCT Rule 46.1.

6. A translation of the amendments to the claims under PCT Article 19 [35 USC 371(c)(3)]:

a. is transmitted herewith.

b. is not required as the amendments were made in the English language.

c. has not been transmitted for reasons indicated at point 5c above.

7. A copy of the International Preliminary Examination Report (PCT/IPEA/409)

- is transmitted herewith.
- is not required as the application was filed with the United States Receiving Office.

8. Annex(es) to the International Preliminary Examination Report

- is/are transmitted herewith.
- is/are not required as the application was filed with the United States Receiving Office.
- is/are not being transmitted as there is/are no Annex(es).

9. A translation of the annexes to the International Preliminary Examination Report

- is transmitted herewith.
- is not required as the annexes are in the English language.
- is not being transmitted for the reason indicated at point 8c above.

10. An oath or declaration of the inventor [35 USC 371(c)(4)] complying with 35 USC 115

- was previously submitted by applicant on (date) _____.
- is submitted herewith and such oath or declaration
 - is attached to the application
 - identifies the application and any amendments under PCT Article 19 which were transmitted as stated in points 5a or b; and states that they were reviewed by the inventor as required by 37 CFR 1.70.
- will be provided in response to a Notice to File Missing Requirements.

11. An International Search Report (PCT/ISA/210) or Declaration under PCT Article 17(2)(a):

- is transmitted herewith.
- has been transmitted by the International Bureau. Date of mailing (from form PCT/IB/308): 15 February 2001 (15.02.01).
- is not required as the application was searched by the United States International Searching Authority.

- d. will be transmitted promptly upon request.
- e. has been submitted by applicant on (date) _____.

12. An Information Disclosure Statement under 37 CFR 1.97 and 1.98:

- a. is transmitted herewith.

Also transmitted herewith is

Form PTO-1449

Copies of citations listed

- b. will be transmitted within THREE MONTHS of the date of submission of requirements under 35 USC 371(c).
- c. was previously submitted by applicant on (date) _____.

13. The applicant claims small entity status with respect to this application.

A Verified Statement Claiming Small Entity Status is attached.

The undersigned claims small entity status on behalf of the applicant.

14. An assignment document is transmitted herewith for recording. A separate "RECORDATION COVER SHEET" is also attached.

15. Additional documents

- a. Copy of request (PCT/RO/101)
- b. International Publication No. WO 01/11092
 - i. Specification, claims and drawing
 - ii. Front page only
- c. Preliminary amendment
- d. Abstract
- e. Other

16. The above checked items are being transmitted

- a. before 30 months from any claimed priority date.
- b. after 30 months but before 32 months (surcharge and/or processing fee included) from any claimed priority date.

17. Certain requirements under 35 USC 371 were previously submitted by the applicant on _____, namely:


John Smith-Hill
Reg. No. 27,730

SMITH-HILL & BEDELL, P.C.
12670 N.W. Barnes Road, Suite 104
Portland, Oregon 97229

(503) 574-3100

901042
1204 FEB 2002

FEE CALCULATION SHEET
Entry into national phase of PCT/FI00/00665

| CLAIMS FEE | (1) FOR | (2) NUMBER FILED | (3) NUMBER EXTRA | (4) RATE | (5) CALCULATIONS |
|--------------|---|------------------|------------------|-----------------------------|------------------|
| * [x] | TOTAL CLAIMS | 9 -20 = | 0 | x \$ 18 = | \$ 0 |
| | INDEPENDENT CLAIMS | 1 - 3 = | 0 | x \$ 84 = | \$ 0 |
| | MULTIPLE DEPENDENT CLAIM(S) (if applicable) | | | + \$280 = | \$ 0 |
| BASIC FEE | [] U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where an International preliminary examination fee as set forth in § 1.482 has been paid on the international application to the U.S. PTO: | | | | |
| | [] and the international preliminary examination report states that the criteria of novelty, inventive step (non-obviousness) and industrial activity, as defined in PCT Article 33(1) to (4) have been satisfied for all the claims presented in the application entering the national state (37 CFR 1.492(a)(4)) | | | \$100 | |
| | [] and the above requirements are not met (37 CFR 1.492(a)(1)) | | | | |
| | [x] U.S. PTO WAS NOT INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where no international preliminary examination fee as set forth in § 1.482 has been paid to the U.S. PTO, and payment of an international search fee as set forth in § 1.445(a)(2) to the U.S. PTO: | | | | |
| | [] has been paid (37 CFR 1.492(a)(2)) | | | \$740 | |
| | [x] has not been paid (37 CFR 1.492(a)(3)) | | | \$1,040 | 1,040 |
| | [] where a search report on the international application has been prepared by the European Patent Office or the Japanese Patent Office (37 CFR 1.492(a)(5)) | | | \$890 | |
| OTHER FEES | Surcharge of \$130 for furnishing the oath or declaration later than 30 months (but no later than 32 months) from any claimed priority date (37 CFR 1.492(e) and 37 CFR 1.495(c)). | | | | |
| | | | | | + |
| | | | | Total of above Calculations | = 1,040 |
| SMALL ENTITY | Reduction by 1/2 for filing by small entity, if applicable. Affidavit must be filed also. (note 37 CFR 1.9, 1.27, 1.28) | | | | - |
| | | | | Subtotal | 1,040 |
| | Processing fee of \$130 for furnishing the English Translation later than 30 months (but not later than 32 months) from any claimed priority date (37 CFR 1.492(f) and 37 CFR 1.495(c)). | | | | + |
| | | | | Total Basic Fee | \$ 1,040 |
| | Fee for recording the enclosed assignment document \$40 (37 CFR 1.21(h)). | | | | + |
| TOTAL | | | | TOTAL FEES ENCLOSED | \$ 1,040 |

* See attached Preliminary Amendment.

[x] A check in the amount of \$1,040.00 to cover the above fees is enclosed.

[x] Please charge any additional **basic** filing fee under 37 CFR 1.492(a) which may be required by this paper, or credit any overpayment to Deposit Account No. 19-2560. (**Do not charge additional claim fees under 37 CFR 1.492(b) or 1.492(c) or the surcharge for belated filing of the Declaration under 37 CFR 1.492(e) to the Deposit Account.**) This sheet is filed in duplicate.

Penelope Stockwell

Penelope Stockwell

FEE CALCULATION SHEET
Entry into national phase of PCT/F100/00665

| CLAIMS FEE | (1) FOR | (2) NUMBER FILED | (3) NUMBER EXTRA | (4) RATE | (5) CALCULA- TIONS |
|---------------|---|---------------------|---------------------|-----------|-----------------------|
| * [x] | TOTAL CLAIMS | 9 -20 = | 0 | x \$ 18 = | \$ 0 |
| | INDEPENDENT CLAIMS | 1 - 3 = | 0 | x \$ 84 = | \$ 0 |
| | MULTIPLE DEPENDENT CLAIM(S) (if applicable) | | | + \$280 = | \$ 0 |
| BASIC FEE | [] U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where an International preliminary examination fee as set forth in § 1.482 has been paid on the international application to the U.S. PTO: | | | | |
| | [] and the international preliminary examination report states that the criteria of novelty, inventive step (non-obviousness) and industrial activity, as defined in PCT Article 33(1) to (4) have been satisfied for all the claims presented in the application entering the national state (37 CFR 1.492(a)(4)) | | | \$100 | |
| | [] and the above requirements are not met (37 CFR 1.492(a)(1)) | | | | |
| | [x] U.S. PTO WAS NOT INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where no international preliminary examination fee as set forth in § 1.482 has been paid to the U.S. PTO, and payment of an international search fee as set forth in § 1.445(a)(2) to the U.S. PTO: | | | | |
| | [] has been paid (37 CFR 1.492(a)(2)) | | | \$740 | |
| | [x] has not been paid (37 CFR 1.492(a)(3)) | | | \$1,040 | 1,040 |
| | [] where a search report on the international application has been prepared by the European Patent Office or the Japanese Patent Office (37 CFR 1.492(a)(5)) | | | \$890 | |
| OTHER FEES | Surcharge of \$130 for furnishing the oath or declaration later than 30 months (but no later than 32 months) from any claimed priority date (37 CFR 1.492(e) and 37 CFR 1.495(c)). | | | | |
| | | | | | + |
| | Total of above Calculations | | | = | 1,040 |
| SMALL ENTITY | Reduction by 1/2 for filing by small entity, if applicable. Affidavit must be filed also. (note 37 CFR 1.9, 1.27, 1.28) | | | | - |
| | | | | | |
| | Subtotal | | | | 1,040 |
| | Processing fee of \$130 for furnishing the English Translation later than 30 months (but not later than 32 months) from any claimed priority date (37 CFR 1.492(f) and 37 CFR 1.495(c)). | | | | |
| | | | | | + |
| | Total Basic Fee | | | \$ | 1,040 |
| | Fee for recording the enclosed assignment document \$40 (37 CFR 1.21(h)). | | | | |
| | | | | | + |
| TOTAL | | | TOTAL FEES ENCLOSED | \$ | 1,040 |

See attached Preliminary Amendment.

[x] A check in the amount of \$1,040.00 to cover the above fees is enclosed.

[x] Please charge any additional basic filing fee under 37 CFR 1.492(a) which may be required by this paper, or credit any overpayment to Deposit Account No. 19-2560. (Do not charge additional claim fees under 37 CFR 1.492(b) or 1.492(c) or the surcharge for belated filing of the Declaration under 37 CFR 1.492(e) to the Deposit Account.) This sheet is filed in duplicate.

Penelope Stockwell



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Taisto YRJÄNÄ et al

Art Unit:

Application No.:

Examiner:

Filed:

For: APPARATUS FOR SUPPORTING MATERIAL
TO BE TREATED IN CONTINUOUSLY
OPERATED THERMAL TREATMENT FURNACES

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Please make the following amendments to this application
prior to examination thereof.

AMENDMENTS

In the Claims:

Claims 3-9, cancel.

Add new claims as follows:

10. (New) An apparatus according to claim 1,
characterized in that in between the control elements there is
installed an intermediate support element.

11. (New) An apparatus according to claim 1,
characterized in that in between the control element and the
sealing element there is installed an intermediate support
element.

12. (New) An apparatus according to claim 1,
characterized in that part of the surface of the control
element and part of the surface of the support element form
part of the circumference of one and the same circle.

13. (New) An apparatus according to claim 1, characterized in that the control element is curved essentially throughout its surface.

14. (New) An apparatus according to claim 1, characterized in that the support element of the support apparatus is provided with a flow-through type cooling agent circulation.

15. (New) An apparatus according to claim 1, characterized in that the control element of the support apparatus is provided with a flow-through type cooling agent circulation.

16. (New) An apparatus according to claim 1, characterized in that the sealing element of the support apparatus is provided with a flow-through type cooling agent circulation.

REMARKS

The above amendments are presented in order to place this application in better condition for examination.

Respectfully submitted,


John Smith-Hill
Reg. No. 27,730

SMITH-HILL & BEDELL, P.C.
12670 N.W. Barnes Road, Suite 104
Portland, Oregon 97229

Tel. (503) 574-3100
Fax (503) 574-3197

Docket: OUTO 2408

APPARATUS FOR SUPPORTING MATERIAL TO BE TREATED IN CONTINUOUSLY OPERATED THERMAL TREATMENT FURNACES

The present invention relates to an apparatus for supporting the material to be
5 treated in continuously operated thermal treatment furnaces, where the
supporting of the material is realized by support elements external to the
furnace.

From the FI patent 67,726, there is known a material support device to be used
10 in thermal treatment furnaces, wherein on the circumference of a cooled roll,
there are placed at least two cooled rolls with essentially smaller diameters.
The larger roll, serving as the support device, is installed externally to the
thermal treatment furnace, or between two successive thermal treatment
furnaces, so that the supporting proper of the material is carried out by means
15 of one circumferentially placed roll at a time. The roll located on the circumfer-
ence of the larger roll rotates at the rotational velocity of the material to be
supported, whereas the mutual position of the circumferentially installed rolls
can be adjusted by means of an actuator arrangement connected to the larger
roll.

20

From figures 3 and 4 appended to the FI patent 67,726 it can be seen that the
shape of the larger roll, which is formed to conform to the shape of the circum-
ference of the smaller roll and arranged around it, prevents the flowing of gas
essentially completely underneath the material to be supported. Thus the
25 temperature of the supported material is at the bottom surface different than at
the top surface. On the other hand, the purpose of the design of the larger roll
specified in the FI patent 67,726 and illustrated in the drawing is to keep the
smaller roll longer in operation by preventing the hot gases from proceeding to
the surface of the smaller roll.

30

The object of the present invention is to eliminate some of the drawbacks of the prior art and to realize an advanced supporting apparatus for material to be treated in thermal treatment furnaces, by means of which apparatus hot gases are made to flow, at the support apparatus, also underneath the material to be supported, without subjecting the smaller roll used for the support proper to an excessive thermal load. The essential novel features of the invention are apparent from the appended claims.

The support apparatus according to the invention for material to be treated in continuously operated thermal treatment furnaces can advantageously be installed essentially near to the orifice of a continuously operated thermal treatment furnace, so that the support apparatus enables an unobstructed flowing of the gas employed in the treatment of the material to be supported, both above and underneath said material. Moreover, the support apparatus constitutes at least part of the thermal treatment furnace sealing. The support apparatus can also be advantageously installed for instance between two continuously operated thermal treatment furnaces, in which case the support apparatus forms part of the sealing of two successive thermal treatment furnaces.

According to the invention, the support apparatus of material to be treated in continuously operated thermal treatment furnaces comprises a housing element, against which at least one support element used for supporting the material is arranged to rest. Against the same housing element, there are advantageously supported two support elements which are installed symmetrically with respect to the housing element. Moreover, the housing element is installed turnably with respect to the support elements, so that the mutual positions of the support elements can be exchanged by rotating the housing element around its axis. The housing element as such is installed essentially horizontally in the vicinity of the orifice of the continuously operated thermal treatment furnace, so that the housing element is advantageously supported by

means of support members provided on both sides of the thermal treatment furnace orifice.

Advantageously the orifice of the thermal treatment furnace is formed of two essentially vertical walls that are interconnected by two essentially horizontal walls which are positioned on different levels. Around the housing element, at the vertical walls of the orifice, at each wall there is installed at least one sealing element, which in part seals the housing element against the thermal treatment furnace, when the support apparatus is in support position. In between the sealing elements providing for the sealing with the vertical walls of the orifice, in connection with the housing element there is installed, advantageously concentrically, one or several elements constituting the sealing together with the horizontal wall, which elements at the same time serve, underneath the material to be supported, advantageously as the control elements of the thermal treatment furnace gas flowing from one thermal treatment furnace to another. In case the number of thermal treatment furnace gas control elements is at least two, in the interval formed by each control element there is advantageously installed, around the housing element of the support apparatus, concentrically at least one intermediate support element. Advantageously the shape of the intermediate support element essentially conforms to the shape of the control element, but it is smaller than the control element, so that when seen from the end of the housing element of the support apparatus, the transversal area of the intermediate support element constitutes 70 - 90% of that of the respective control element. The intermediate support element can also be installed in the space left between the sealing element and the control element. Thus the intermediate support element can be used in the support apparatus according to the invention also when only one control element is installed around the housing element.

When the support apparatus according to the invention is in operating position, the support element of said apparatus, which advantageously is roller-shaped,

supports the material to be supported that proceeds at an essentially high velocity past the support element, so that the support element rotates at an essentially equal velocity with the material to be supported. The control element, installed in connection with the housing element used for supporting

5 the support element, controls the gas of the thermal treatment furnace, so that the gas can also flow underneath the material to be supported.

In order to prevent additional thermal load caused by gas flows on both sides of the support element, the support element is provided with a cooling agent lead-
10 through, in which case there is obtained an essentially efficient heat transfer away from the support element. In heat transfer, there is advantageously used a flow-through type cooling agent circulation. Here the term flow-through type circulation means that the end where the cooling agent is discharged is different from the end where it is fed in. However, the flowing of the cooling agent in
15 connection with the support element can include partial recirculation, in which case the passage of the cooling agent in some parts of the flow is opposite to the flow-through proper. Moreover, the sealing elements of the support element are provided with a lead-through type circulation of the cooling agent, in which case also the housing element of the support apparatus can be protected
20 against an excessive thermal load.

In the support apparatus according to the invention, the sealing element and the control element installed around the housing element are advantageously made of some ceramic material, whereas the intermediate support element
25 provided in between the two control elements is advantageously made of metal.

The invention is explained in more detail with reference to the accompanying drawings, where
figure 1 is a side-view illustration of a preferred embodiment of the invention,
30 seen in a partial cross-section,

figure 2 is an illustration of the embodiment of figure 1, seen in the direction A - A,

figure 3 is an illustration of the embodiment of figure 1, seen in the direction B - B, and

5 figure 4 is an illustration of the embodiment of figure 1, as installed at the orifice of an thermal treatment furnace.

According to the drawings, against the housing element 1 of the support apparatus according to the invention, there is supported, by means of supports 10 members 2, support rollers 4 meant for supporting the material 3 to be thermally treated. The support rollers 4 are installed symmetrically with respect to the housing element 1. In the housing element 1, there are connected members (not illustrated) in order to rotate the housing element, so that the mutual position of the support rollers 4 with respect to the housing element 1 15 can be changed.

Around the housing element 1, in the middle section thereof, there are installed gas flow control elements 5, which at the same time serve as part of the sealing of the thermal treatment furnace 6. In shape, the control element 5 is essentially symmetrical with respect to the housing element 1, so that the control element 5 is thinnest at the housing element 1. The ends 7 of the control element 5 that deviate from the housing element 1 are designed so that the ends 7 form part of the circumference 9 of the same circle that also passes via the spot 10 of the support rollers 4 that is located farthest away from the 25 housing elements 1. That section of the surface of the control element 5 that is located between the end 7 of the control element 5 and the housing element 1 also is advantageously curved in shape, in order to obtain an essentially unobstructed gas flow through the aperture formed between the support roller 4 and the control element 5. Between the control elements 5, around the housing 30 element 1, concentrically with the control elements 5, there are installed intermediate support elements 13, which in shape conform to the control elements,

but in transversal area represent, when seen at the end of the housing element 1, about 80% of the measures of the control element 5.

Around the housing element 1, on both sides of the control element 5 and thus 5 concentrically with respect to the control element 5, there are installed sealing elements 11, which on hand seal the apparatus according to the invention to the thermal treatment furnace 6, and on the other hand serve as a circulation guide to the gases flowing out of the thermal treatment furnace. The sealing elements 11 are installed, with respect to the thermal treatment furnace 6, so 10 that the sealing elements 11 constitute sealing with the vertical walls of the orifice of the thermal treatment furnace 11. Further, the sealing elements 11 are shaped so that the sealing elements 11 prevent the gases from flowing essentially underneath the support rollers 4 and past them to the external surroundings of the thermal treatment furnace 6 and the support arrangement 1.

15

The housing element 1, the control element 5, the sealing element 11 and the intermediate support element 13, as well as the support roller 4 serving as the support element are provided with a flow-through type cooling agent circulation 12 in order to achieve an essentially efficient cooling.

20

CLAIMS

1. An apparatus for supporting material to be treated in continuously operated thermal treatment furnaces, where the supporting of the material is realized by means of support elements installed externally to the furnace, in the vicinity of the orifice of the thermal treatment furnace, said apparatus comprising at least two support elements that are installed movably, so that the mutual positions of the support elements can be adjusted by means of the drive arrangement of the support apparatus, **characterized** in that in connection with the housing element (1) used for supporting the support elements (4), there is installed at least one gas control element (5), which enables the flowing of the gas used in the treatment of the material (3) between the support element (4) and the control element (5), said control element (5) at the same time constituting part of the sealing of the thermal treatment furnace (6).
- 15 2. An apparatus according to claim 1, **characterized** in that the control element (5) is installed between two sealing elements (11), so that the sealing elements (11) enable the directing of the gas flow essentially in parallel to the flowing direction of the material (3) to be supported, underneath the material to be supported, between the support element (4) and the control element (5).
3. An apparatus according to claim 1 or 2, **characterized** in that in between the control elements (5), there is installed an intermediate support element (13).
- 25 4. An apparatus according to claim 1, 2 or 3, **characterized** in that in between the control element (5) and the sealing element (11), there is installed an intermediate support element (13).
5. An apparatus according to any of the preceding claims, **characterized** in that 30 part of the surface (7) of the control element (5) and part of the surface (10) of

the support element (4) form part of the circumference of one and the same circle (9).

6. An apparatus according to any of the preceding claims, **characterized** in that
5 the control element (5) is curved essentially throughout its surface.

7. An apparatus according to any of the preceding claims, **characterized** in that
the support element (4) of the support apparatus is provided with a flow-through
type cooling agent circulation (12).

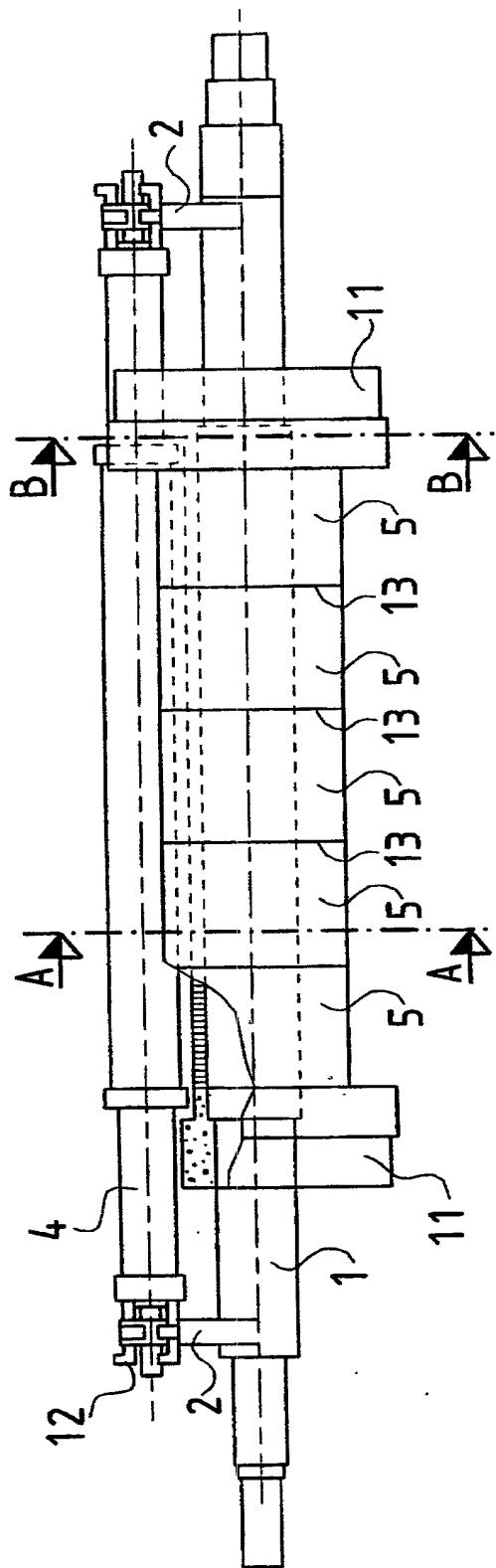
10

8. An apparatus according to any of the preceding claims, **characterized** in that
the control element (5) of the support apparatus is provided with a flow-through
type cooling agent circulation (12).

15 9. An apparatus according to any of the preceding claims, **characterized** in that
the sealing element (11) of the support apparatus is provided with a flow-
through type cooling agent circulation (12).

ABSTRACT

The invention relates to an apparatus for supporting material to be treated in continuously operated thermal treatment furnaces, where the supporting of the material is realized by means of support elements installed externally to the thermal treatment furnace, in the vicinity of the orifice of the furnace, said apparatus comprising at least two support elements that are installed movably, so that the mutual positions of the support elements can be adjusted by means of a drive arrangement of the support apparatus. According to the invention, in connection with the housing element used for supporting of the support elements, there is installed at least one gas flow control element which enables the flowing of the gas used for treating the material between the support element and the control element, said control element also constituting part of the sealing of the thermal treatment furnace.



1

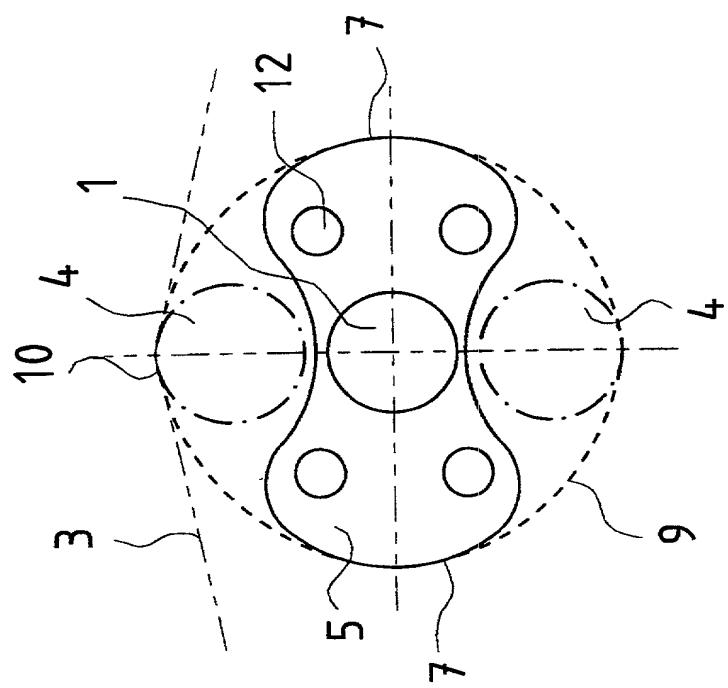


Fig. 2

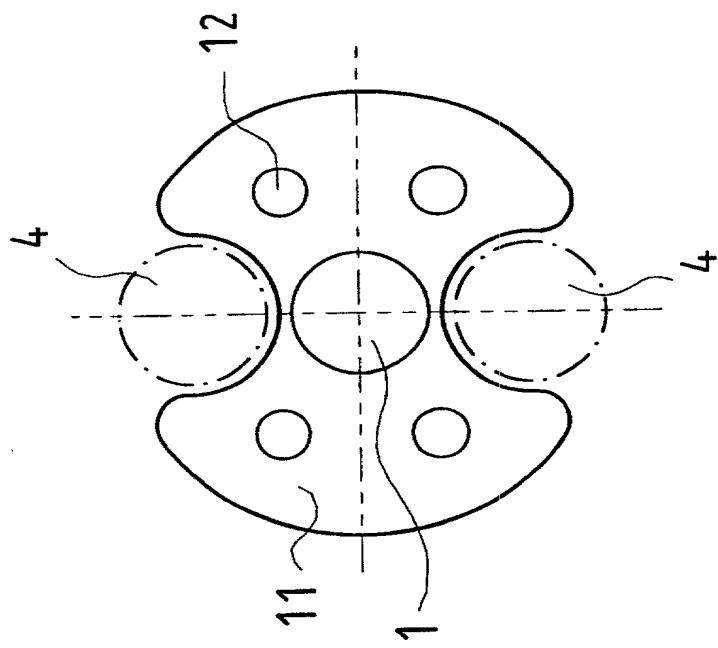


Fig. 3

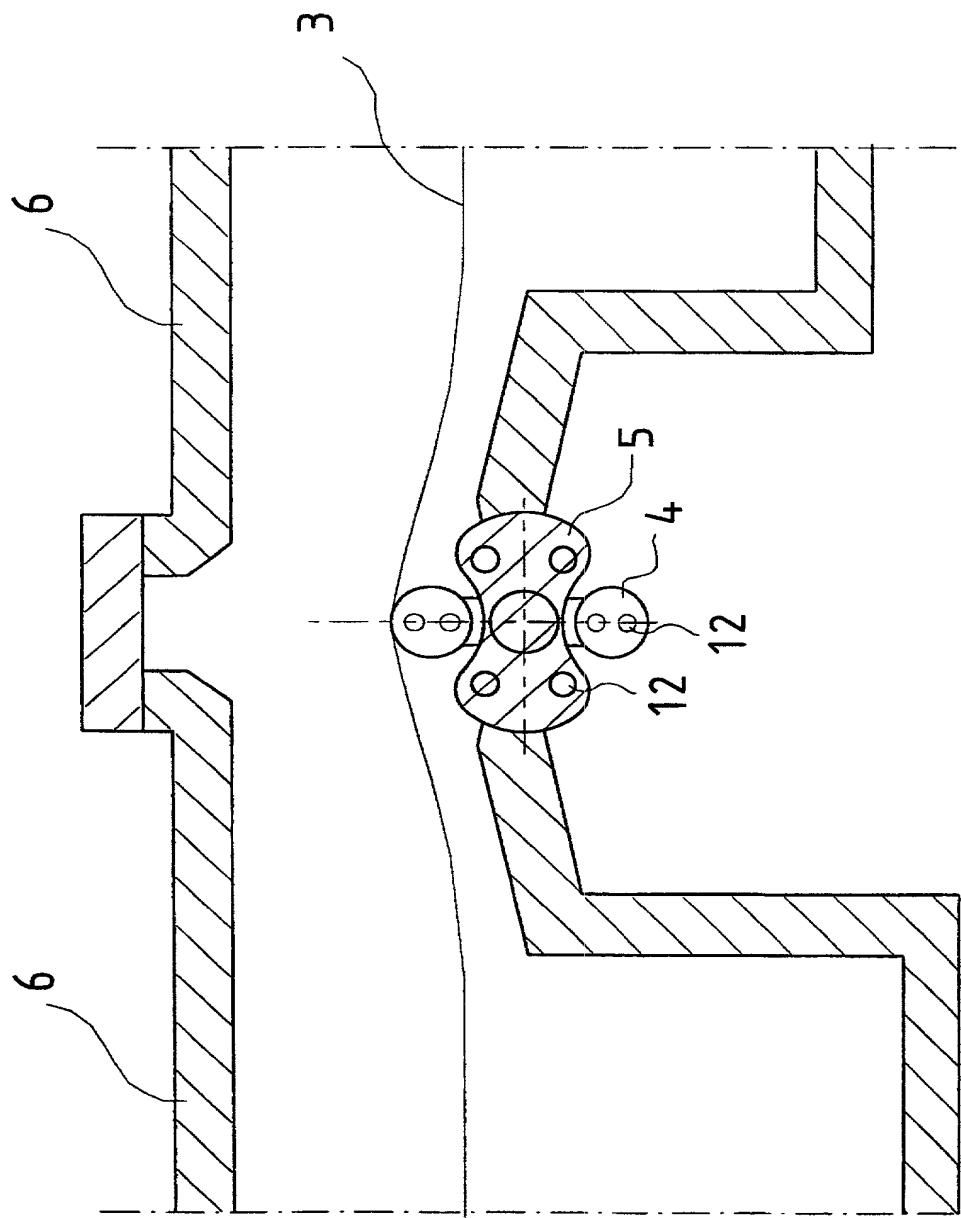


Fig. 4

791668 US

Attorney's Docket No. _____

DECLARATION FOR PATENT APPLICATION
(COMBINED WITH POWER OF ATTORNEY)
(ORIGINAL APPLICATION)

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name. I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

Apparatus for supporting material to be treated in continuously operated thermal treatment furnaces

the specification of which is attached hereto unless box (a) or (b) is checked, in which case

(a) [] the specification was filed on _____ as Application No. _____.

(b) [X] the specification was filed as PCT International Application No. PCT/FI00/00665 filed on August 2000 and was amended under PCT Art. 19 on _____ (if any).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Sec. 1.56.

I have identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America and filed less than 12 months (6 months for designs) prior to this United States application and of which I claim foreign priority benefits under Title 35, United States Code, Sec. 119, and I have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

EARLIEST FOREIGN APPLICATION, AND ALL FOREIGN
APPLICATIONS FILED MORE THAN 12 MONTHS (6 MONTHS FOR DESIGN)
PRIOR TO THIS U.S. APPLICATION

| <u>Country</u> | <u>Application No.</u> | <u>Date of Filing</u> (month/day/year) |
|----------------|------------------------|---|
| Finland | 991668 | 4 August 1999 |

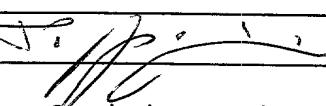
As a named inventor, I hereby appoint the practitioners associated with **Customer Number 007812** (John Smith-Hill, Reg. No. 27,730 and Daniel J. Bedell, Reg. No. 30,156) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith and in connection with the resulting patent.

Send correspondence to the correspondence address associated with **Customer Number 007812**.

I hereby authorize the practitioners that I have appointed to accept instructions regarding this application and the resulting patent from OUTOKUMPU OYJ.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Title 18, United States Code, Sec. 1001, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of sole or first joint inventor _____

YRJÄNÄ, Taisto 

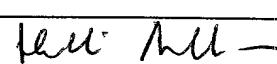
Inventor's signature _____

Date 7 February 2002 Country of Citizenship Finland

Residence Tornio, Finland 

Post Office Address Hallituskatu 5 B 22,
FIN-95400 Tornio, Finland

Full name of second joint inventor, if any _____

ARFFMAN, Heikki 

Inventor's signature _____

Date 7 February 2002 Country of Citizenship Finland

Residence Tornio, Finland 

Post Office Address Petäjätie 2
FIN-95410 Kiviranta, Finland

3.00
Full name of third joint inventor, if any _____
UURTAMO, Heikki

Inventor's signature *H. Uurtamo*

Date 7 February 2002 Country of Citizenship Finland

Residence Tornio, Finland FTX

Post Office Address Ainolanvainiontie 4
FIN-95450 Tornio, Finland

4.00
Full name of fourth joint inventor, if any _____
LEINONEN, Risto

Inventor's signature *Risto Leinonen*

Date 7 February 2002 Country of Citizenship Finland

Residence Tornio, Finland FTX

Post Office Address Ratavarrentie 6
FIN-95450 Tornio, Finland

5.00
Full name of fifth joint inventor, if any _____
YLI-NIEMI, Jussi

Inventor's signature *Jussi Yli-Niemi*

Date 7 February 2002 Country of Citizenship Finland

Residence Tornio, Finland FTX

Post Office Address Hietasentie 7
FIN-95450 Tornio, Finland

Full name of sixth joint inventor, if any _____

Inventor's signature _____

Date _____ Country of Citizenship _____

Residence _____

Post Office Address _____

Full name of seventh joint inventor, if any _____

Inventor's signature _____

Date _____ Country of Citizenship _____

Residence _____

Post Office Address _____